

Technical Memorandum

Significant Phosphorus Point Sources in the Double Pipe Creek Watershed

The U.S. Environmental Protection Agency (EPA) requires that Total Maximum Daily Load (TMDL) allocations account for all significant sources of each impairing pollutant (CFR 2011). This technical memorandum identifies the significant point sources of phosphorus in the Double Pipe Creek watershed. Detailed allocations are provided for those point sources included within the National Pollutant Discharge Elimination System (NPDES) Process Water Waste Load Allocation (WLA) and Regulated Stormwater WLA of the Double Pipe Creek TMDL Contributions (See Executive Summary of the main report for further description of all watershed TMDL contributions and allocations). The WLA also includes an allocation to concentrated animal feeding operations (CAFOs), but the WLA for CAFOs is not presented here in more specific detail than in the main report. The State reserves the right to allocate the TMDLs among different sources in any manner that is reasonably calculated to protect aquatic life from nutrient related impacts.

The Double Pipe Creek Watershed Phosphorus TMDLs are presented in terms of an average annual load established to be protective of aquatic health. WLAs have been calculated for NPDES regulated individual industrial, individual municipal, individual municipal separate storm sewer systems (MS4s), general industrial stormwater, and general MS4 permits in the Double Pipe Creek watershed. The permits can be grouped into two categories, process water and stormwater.

The NPDES process water category includes those loads generated by the following continuous discharge sources: (1) major publically-owned wastewater treatment plants (WWTPs) (facilities with flow of 0.5 MGD or more) that are slated for Enhanced Nutrient Removal (ENR); (2) minor municipal WWTP (facilities discharging less than 0.5 MGD) and industrial facilities whose permits have total phosphorus (TP) limits; (3) minor municipal WWTPs with no phosphorus permit limits; and (4) industrial facilities which, based on the process involved, are expected to discharge nutrients. There are six industrial and six municipal facilities permitted to discharge phosphorus in the Double Pipe Creek watershed. One of municipal WWTPs, the Westminster WWTP (MD0021831), is a major facility slated for ENR.

The WLAs for process water sources are based on the WLAs assigned to each facility under the Chesapeake Bay TMDL (EPA, 2010) and Maryland's Phase I and Phase II Watershed Implementation Plans (WIPs) (MDE 2010 and 2012, respectively). These WLAs are designed to meet the Phase II 2025 final implementation goal for the Bay TMDL. The WLAs are loading caps which are designed to accommodate future growth after full implementation of the Bay TMDL in 2025. The WLAs for major municipal facilities are calculated based on their phosphorus permit limits and design flow. The WLAs for minor municipal facilities with phosphorus permit limits are calculated based on their Maryland Tributary Strategy flow and their permit limit concentration. The remainder of the minor municipal facilities WLAs are

FINAL

calculated based on their Maryland Tributary Strategy flow and expected maximum phosphorus concentrations of 3 mg/l. The Maryland Tributary Strategy flow for a WWTP is the design flow or the projected 2020 flow, whichever is less. Six industrial facilities discharging process water in the Double Pipe Creek watershed have the capacity to discharge TP in their process water. Under the Chesapeake Bay TMDL, industrial facilities capable of discharging phosphorus in their process water were given WLAs based on the results of monitoring required by their permits or professional judgment. These WLAs were adopted for the Double Pipe Creek Phosphorus TMDL.

Table 1 provides one possible scenario for the distribution of the average annual phosphorus point source loads attributed to the process water point sources in the Double Pipe Creek watershed. An individual WLA is given for the one major facility, and an aggregate WLA is given for all minor process water facilities in the watershed including both municipal and industrial facilities. (See Sections 2.2.2 and 4.6 of the main report for further details.)

The stormwater category includes all NPDES regulated stormwater discharges. There are nineteen NPDES Phase I and Phase II stormwater permits identified throughout the Double Pipe Creek watershed. These include both general Phase I and II stormwater permits. These stormwater permits are regulated based on Best Management Practices (BMPs) and do not include nutrient limits. In the absence of nutrient limits, the baseline loads for these NPDES regulated stormwater discharges are calculated using phosphorus loading rates and acreages from developed land-uses within the watershed. These calculations are described in more detail below.

Individual WLAs have been calculated for each of the Phase I county MS4 permits and the SHA Phase I MS4 permit. An aggregate WLA has been calculated for the general Phase II NPDES stormwater permits for the cities of Taneytown and Westminster and for the towns of New Windsor and Union Bridge. Other NPDES permits include stormwater from federal, state, mining and extractive operations, and land under construction, which are aggregated into one WLA referred to as the "Other NPDES regulated stormwater" WLA.

The computational framework chosen for the Double Pipe Creek watershed TMDL was the Chesapeake Bay Program Phase 5.3.2 (CBP P5.3.2) Watershed Model. Within this TMDL, the NPDES regulated stormwater baseline phosphorus loads generated within the Double Pipe Creek watershed are calculated from edge-of-stream (EOS) loads within the watershed and represent a long-term average loading rate. EOS loads are calculated as a product of the developed land-use acreage and the average annual simulated phosphorus loading rates (lbs/ac/yr) from the 2009 Progress Scenario (US EPA 2010b). The 2009 Scenario represents current land-use, loading rates, and BMP implementation simulated using precipitation and other meteorological inputs from the period 1991-2000 to represent variable hydrological conditions. The 1991-2000 simulation period represents the baseline loading rates in the TMDL for Chesapeake Bay segments. Further details of the phosphorus load calculations from developed land can be found in Section 2.2.1 of the main report.

To determine the different NPDES stormwater WLAs, MDE has further refined the CBP P5.3.2 developed land-use. The refined CBP P5.3.2 land-use contains the specific level of detail needed

FINAL

to determine individual and aggregate WLAs for the Frederick County Phase I jurisdictional MS4, the Carroll County Phase I jurisdictional MS4, the SHA MS4, the Phase II jurisdictional MS4s, and “Other NPDES regulated stormwater”. The methods used by MDE to refine CBP P5.3.2 developed land-use are described within CBP P5.3.2 Land Use and MDE Urban Source Sector Delineation - Development Methodology (MDE 2009a).

In order to achieve the estimated phosphorus load reductions applied to urban land, which are necessary to meet the TMDL, current Carroll County and Frederick County Phase I MS4 permits require the jurisdictions to retrofit 10% of existing impervious area where there is failing, minimal, or no stormwater management (estimated to be areas developed prior to 1985) every permit cycle (five years) (*i.e.*, the jurisdiction needs to install/institute stormwater management practices to treat runoff from these existing impervious areas) (MDE 2009a). Extending these permitting requirements to all urban stormwater sources (*i.e.*, not solely those sources regulated via the individual County Phase I MS4 permits) would require that all impervious areas developed prior to 1985 be retrofit at this pace. Additionally, MDE estimates that future stormwater retrofits will have, on average, a 35% TP reduction efficiency (Claytor and Schueler 1997; Baldwin *et al.* 2007; Baish and Caliri 2009). By default, these retrofits will also provide treatment of any adjacent urban pervious runoff within the applicable drainage area (See Sections 4.5 and 4.6 of the main report for further details).

Table 2a provides a detailed list of all NPDES regulated stormwater discharges within the Double Pipe Creek watershed. Table 2b provides one possible scenario for the distribution of the average annual phosphorus point source loads attributed to NPDES regulated stormwater point sources in the Double Pipe Creek watershed. (See Sections 4.5 - 4.6 of the main report for further details).

In January 2009, Maryland implemented new regulations governing CAFOs (COMAR 26.08.01, 26.08.03, and 26.08.04), which were approved by the EPA in January, 2010. Under these regulations, CAFOs are required to fulfill the conditions of a general permit. These conditions include instituting a Comprehensive Nutrient Management Plan (CNMP) which meets the Nine Minimum Standards to Protect Water Quality (MDE 2009b). The general permit also prohibits the discharge of pollutants, including nutrients, from CAFO production areas except as a result of an event greater than the 25-year, 24-hour storm. Table 3 provides the baseline load and WLA for CAFOs.

Table 1: Double Pipe Creek Phosphorus TMDL Allocations for Process Water Point Sources

NPDES Permit #	Process Water Point Source	WLA Type		Baseline Load (lbs/yr)	TMDL Load (lbs/yr)	Reduction (%)
		Municipal	Individual			
MD0021831	WESTMINSTER WWTP	Municipal	Individual	8,319	4,568	45%
MD0022454	UNION BRIDGE WWTP	Municipal	Aggregate	2,621	1,742	34%
MD0022586	NEW WINDSOR WWTP					
MD0066745	PLEASANT VALLEY WWTP					
MD0065927	RUNNYMEDE WWTP					
MD0067571	BOWLING BROOK PREPARATORY SCHOOL					
MDG915060	SHEETZ STORE #177	Industrial	Aggregate	2,621	1,742	34%
MDG490226	LAFARGE - MEDFORD QUARRY					
MDG492448	LEHIGH CEMENT COMPANY – NEW WINDSOR QUARRY					
MDG498000	MEDFORD QUARRY (REICHLIN TRACT)					
MDG490433	THOMAS, BENNETT & HUNTER, INC. – WESTMINSTER CONCRETE					
MDG499720	STAMBAUGH'S INCORPORATED					
Total				10,940	6,310	42%

Table 2a: NPDES Regulated Stormwater Permits in the Double Pipe Creek Watershed

NPDES Permit #	Facility	NPDES Group
MD0068357	FREDERICK COUNTY MS4	County Phase-I
MD0068331	CARROLL COUNTY MS4	County Phase-I
MD0068276	STATE HIGHWAY ADMINISTRATION MS4	SHA Phase-I
MDR055500	CITY OF TANEYTOWN MS4	Municipal Phase-II
MDR055500	CITY OF WESTMINSTER MS4	Municipal Phase-II
MDR055500	TOWN OF NEW WINDSOR MS4	Municipal Phase-II
MDR055500	TOWN OF UNION BRIDGE MS4	Municipal Phase-II
	MDE GENERAL PERMIT TO CONSTRUCT	Other NPDES Reg SW
02SW0029	MARADA INDUSTRIES, INC. - PLANT 1	Other NPDES Reg SW
02SW0662	BARK HILL LANDFILL	Other NPDES Reg SW
02SW0663	BACHMAN VALLEY TIRE FACILITY	Other NPDES Reg SW
02SW0665	JOHN OWINGS LANDFILL	Other NPDES Reg SW
02SW0920	UNIVERSAL FOREST PRODUCTS EASTERN DIVISION	Other NPDES Reg SW
02SW1098	HAHN TRANSPORTATION, INC. – UNION BRIDGE	Other NPDES Reg SW
02SW1456	BABYLON VAULT COMPANY, INC.	Other NPDES Reg SW
02SW1821	IMRM WESTERN CARROLL SITE	Other NPDES Reg SW
02SW1861	CARROLL COUNTY MAINTENANCE FACILITY	Other NPDES Reg SW
02SW3013	ALMEGA MANUFACTURING CORP.	Other NPDES Reg SW
02SW3014	INTROL COMPANY, INC.	Other NPDES Reg SW

Note: Although not listed in this table, some individual permits from Table 1 incorporate stormwater requirements and are accounted for within the NPDES stormwater WLA.

Table 2b: Double Pipe Creek Phosphorus TMDL Allocations for NPDES Regulated Stormwater Point Sources

NPDES Regulated Stormwater Point Source	NPDES Permit Number	Baseline Load (lbs/yr)	TMDL (lbs/year)	Reduction (%)
Municipal Phase II MS4	MDR055500	6,912	2,112	69%
Carroll County Phase I	MD0068331	9,276	2,329	75%
Frederick County Phase I	MD0068357	1,115	301	73%
SHA Phase I MS4	MD0068276	1,935	653	66%
“Other NPDES Regulated Stormwater”	N/A	5,894	3,605	39%
Total		25,133	9,001	64%

Note: Individual load contributions may not add to total load due to rounding.

Table 3: Double Pipe Creek Phosphorus TMDL Allocations for NPDES Regulated Concentrated Animal Feeding Operations

NPDES Regulated Animal Feeding Operations	Baseline Load (lbs/yr)	TMDL (lbs/year)	Reduction (%)
	1,001	461	54%

FINAL

REFERENCES

- Baish, A. S., and M. J. Caliri. 2009. *Overall Average Stormwater Effluent Removal Efficiencies for TN, TP, and TSS in Maryland from 1984-2002*. Baltimore, MD: Johns Hopkins University.
- Baldwin, A. H., S. E. Weammert, and T. W. Simpson. 2007. *Pollutant Load Reductions from 1985-2002*. College Park, MD: Mid Atlantic Water Program.
- Claytor, R., and T. R. Schueler. 1997. *Technical Support Document for the State of Maryland Stormwater Design Manual Project*. Baltimore, MD: Maryland Department of the Environment.
- CFR (Code of Federal Regulations). 2011. *40 CFR 130.2(i)*.
http://edocket.access.gpo.gov/cfr_2011/julqtr/40cfr130.2.htm (Accessed March, 2012).
- COMAR (Code of Maryland Regulations). 2012. *26.08*
http://www.dsd.state.md.us/comar/subtitle_chapters/26_Chapters.aspx#Subtitle08 (Accessed March, 2012).
- US EPA (U.S. Environmental Protection Agency). 2010a. *Chesapeake Bay Total Maximum Daily Load*. U.S. Environmental Protection Agency, Chesapeake Bay Program Office, Annapolis MD. December 2010.
- US EPA (U.S. Environmental Protection Agency). 2010b. *Chesapeake Bay Phase 5.3 Phase 5.3 Community Watershed Model*. EPA 903S10002 - CBP/TRS-303-10. U.S. Environmental Protection Agency, Chesapeake Bay Program Office, Annapolis MD. December 2010. Also available at
<http://ches.communitymodeling.org/models/CBPhase5/documentation.php#p5modeldoc>
- MDE (Maryland Department of the Environment). 2009a. *Memorandum: Maryland's Approach for Calculating Nutrient and Sediment Stormwater Wasteload Allocations in Local Nontidal Total Maximum Daily Loads and the Chesapeake Bay Total Maximum Daily Load*. Baltimore, MD: Maryland Department of the Environment.
- _____. 2009b. General Discharge Permit for Animal Feeding Operations. Maryland Permit No. 09AF. NPDES Permit No. MDG01. Baltimore, MD: Maryland Department of the Environment.
http://www.mde.maryland.gov/programs/Land/SolidWaste/CAFOMAFO/Documents/www.mde.state.md.us/assets/document/waste/AFO_General_Permit.pdf (Accessed March, 2012).
- _____. 2010. *Maryland's Phase I Watershed Implementation Plan for the Chesapeake Bay Total Maximum Daily Load*. Baltimore, MD: Maryland Department of the Environment. Also Available at

FINAL

http://www.mde.maryland.gov/programs/Water/TMDL/TMDLHome/Pages/Final_Bay_WIP_2010.aspx.

_____. 2012. Draft. *Maryland's Phase II Watershed Implementation Plan for the Chesapeake Bay Total Maximum Daily Load*. Baltimore, MD: Maryland Department of the Environment. Also Available at

http://www.mde.state.md.us/programs/Water/TMDL/TMDLImplementation/Pages/DRAFT_PhaseII_WIPDocument_Main.aspx.